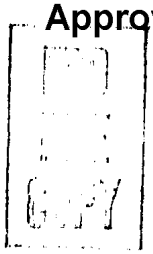

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SOVIET BLOC INTERNATIONAL GEOPHYSICAL YEAR INFORMATION

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PLEASE NOTE

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Table of Contents

I. UPPER ATMOSPHERE

Soviet Study on Attenuation of Light in the Earth's Atmosphere

A detailed work on the attenuation of light by the earth's atmosphere reports on measurements of the spectral transparency of the atmosphere and of the water vapor content in a vertical column through the entire depth of the atmosphere. The experiments were carried out with simple observatory instruments. In the observations, which were conducted in 1954, a single-prism spectrograph with comparatively low resolution was used. The output slot of the spectrograph (used as a monochromator) separated about 210 angstroms in the region of one micron. The energy pickup was a silver sulfide photocell with a very simple barrier layer.

Observations of the spectral transparency of the atmosphere on 36 days revealed a dependence of the coefficient of transparency on wave length in the spectral region of 420-1,010 millimicrons.

On the basis of more than 500 determinations of the water vapor content throughout the entire depth of the atmosphere, and a measurement of the absolute humidity at the surface of the earth, the seasonal pattern of the water vapor content over the entire thickness of the atmosphere was established and compared with the course of the absolute humidity at the earth's surface.

The coefficient of correlation between the water vapor content in a vertical column of the atmosphere and the absolute humidity at the surface was computed as $r = 0.87 \pm 0.03$. The equation of regression, expressing w in terms of q, has the form: $w = 1.92\ q + 0.09$.

The mean square error of the regression formula is equal to 0.26 cm of precipitated water. This indicates that a measurement of the absolute humidity at the surface of the earth may be used to determine the water vapor content over the entire thickness of the atmosphere, with an average error of 0.26 cm of precipitated water.

It is also shown that it is possible, within rather wide limits, to make use of the root-mean-square law to determine the water vapor content in relative units according to observed absorption bands in the near infrared.

On the basis of observations of the spectral transparency of the atmosphere, simultaneous determinations of the water vapor content, and a determination of optical properties, it was possible to separate the total attenuation of light by the earth's atmosphere into individual components (molecular scattering, attenuation by water vapor, aerosol scattering, etc.).

In separating the attenuation by water vapor, the Foule coefficients of scattering by water vapor at various wave lengths were confirmed.

In connection with observations of the spectral transparency, the Loschmidt number N was determined -- assuming an anisotropic molecule -- for days following precipitation, when the attenuation of light by the earth's atmosphere was caused, in general, only by molecular scattering and a decrease of water vapor, which were capable of being distinguished independently. The Loschmidt number determined, N = (2.68 plus-minus 0.02) $.10^{19}$ was in agreement with accurate laboratory data (2.686 $.10^{19}$), which indicates the advantage of the correction for the anisotropic molecule in the calculation of molecular scattering.

It was found that the aerosol attenuation of light, which was obtained by subtracting the attenuation by water vapor from the total attenuation of molecular scattering, has three degrees of dependence on wave length: it can be neutral; it can increase uniformly with diminishing wave length; or it can follow an extreme course with a maximum, the location of which varies for various days and lies within the limits 460-520 millimicrons.

The author thanks the director of the Department of Atmospheric Physics of the Astrophysics Institute, Ye. V. Pyaskovskaya-Fesenkova, for supervising the work, and the senior laboratory associate of the institute, N. I. Ovchinnikova, who made the observations with the aureole photometer. ("On the Question of the Role of Various Factors in the Attenuation of the Light of the Earth's Atmosphere," by T. P Toropova; Alma Ata, Izvestiya Astrofizicheskogo Instituta Akademiya Nauk Kazakhskoy SSR, Vol 6, 1958 pp 3-72)

Sino-Soviet Expedition Observes Annular Eclipse of the Sun

"A joint expedition, in which 22 Soviet and 31 Chinese specialists took part, was organized by scientific institutions of the Academy of Sciences USSR and the Academia Sinica of the Chinese People's Republic of China.

"Supervision of the expedition was conducted by A. P. Molchanov, acting for the Academy of Sciences USSR, and Ch'eng Fang-yun, acting for the Academia Sinica. A special committee, headed by Wu Yu-hsun vice president of the Academia Sinica, was created for guaranteeing the work of the expedition. The organization of the expedition in the USSR came under the supervision of A. A. Mikhaylov, chairman of the Astronomical Council."

The experiences of the expedition are reported in two parts -- radio astronomical observations and optical observations. A full translation of these reports follows.

Radio Astronomical Observations (A. P. Molchanov and Ch'eng Fang-yun)

Radio astronomical observations of solar eclipses, both the full eclipse and the annular eclipse, are of great interest because of their ability to isolate radiation from small sources, which at present cannot be accomplished by other means. In addition, the most important reasons are the determination of the spectrum and structure of local sources of both nonpolarized and polarized radiation, the variation of the residual flow of radio emission during the time of minimum distance between the centers of the Moon and the Sun, and the investigation of the shape of the Sun.

The observations of the eclipse in 1958, which was a year of maximum solar activity, were especially interesting.

The expedition set up seven radiotelescopes, and observations were conducted over a wide wave range according to a program worked out under the direction of S. E. Khaykin, chairman of the Commission on Radio Astronomy of the Astronomical Council, Academy of Sciences USSR.

Groups of associates of the Main Astronomical Observatory (supervisors A. P. Molchanov and D. V. Korol'kov; radiotelescopes with ranges of λ=2 cm, λ = 3.2 cm, λ = 3.3 cm, λ = 4.5 cm, and λ=5.1 cm), the Institute of Physics imeni P. N. Lebedev (supervisor, A. Ye. Salomonovich; radiotelescope with a range of λ=0.8cm), and the Byurakan Observatory of the Academy of Sciences Armenian SSR (supervisor, E. G. Mirzabekyan; radiotelescope with a range of λ=50 cm), took part in the expedition.

It should be mentioned that almost all of the apparatus were original designs, and many of the (λ=0.8-2.0-5.1 cm) measured simultaneously both the polarized as well as the nonpolarized components, one (λ=3.3 cm) measured the circular and linear polarization, and one (λ = 3.2 cm) with a scanning device was calculated for the use of new methods of investigating radio emissions of the Sun. The apparatus working on a wave length of λ=50 cm was an interferometer. On a wave length of λ= 4.5 cm, it measured only the nonpolarized component of the radiation.

The presence of apparatus working on waves shorter than 3 cm and in the optical range required the careful selection of the expedition's operating location. Thanks to the special attention accorded the expedition by various organizations of China, in Canton, and on the island of Hainan, a detailed study of meteorological data was made and several points in the track of the eclipse were examined. The selection rested on the region of the city of San-ya, Hainan Island, which was distinguished by the low number of hazy days in April and comparatively weak winds. Observations confirmed the correctness of the selection. During 1 1/2 months there were only 3 days of rain.

Observations of the eclipse were successfully carried out with all the apparatus of the expedition. Some preliminary conclusions can be drawn until a detailed processing of the records can be made.

In a majority of the equipment (λ=3.2, 4.5, and 5.1 cm) distinct variations of the derivative at the moment the sunspots were covered and uncovered by the lunar disk were registered, which made it possible to estimate the brightness temperature of local sources of radio emissions in these regions.

The covering and uncovering of spots produced no variations in the recording for waves of λ=0.8 cm and λ=2 cm, which would make it possible to estimate the upper limits of radio emissions of these sources in these regions.

Thus, at the same time and under the same conditions, data on a local source occurring near No 188 group of spots (numbered according to the bulletin Solnechnyye Dannyye) on five waves in the centimeter range (of these, two according to the upper limit) and on a 50 cm wave of the decimeter range were obtained. These results, apparently for the first time, give a reliable spectrum of local sources both in nonpolarized emission and in circular polarized emission which is of great scientific value, since only data obtained on several waves simultaneously make it possible to attempt the calculation of the effective temperature and intensity of the magnetic field in the lower layers of the Sun's corona.

An analysis of the recordings showed that on waves with λ=3.2, 4.5, 5.1 cm the radio emission came from not one single large area over a group of spots, but from several areas located over the center of spots and having dimensions of the order of one angular minute. Such a separation was determined quite distinctly both in nonpolarized emission as well as in polarized emission according to range (with λ=3.3 and 5.1 cm). In the latter case, it was noted that the leader spots corresponded to the southern pole, and the trailer spots of the groups to the northern pole, which agreed with the results of the optical observations. However, the data of radio astronomical observations are related to considerably higher layers of the Sun's atmosphere.

The separation of local source emission into regions is of great value for studying coronal condensations in the Sun's atmosphere, to which at present increased radio emissions are attributed with a high degree of probability.

The investigation of the radio emission of local sources on a wave length of λ=3.2 cm was conducted not only according to the variation of the steepness of the curve of the recording, but also according to the shifting of the effective center of the Sun's radiation occurring during the covering and uncovering of the sources (λ=3.2 cm). The results of the observations by these unrelated methods were in good agreement.

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Sources in the region of several other spots occurring on the Sun at the moment of observation were registered in addition to the source located near the No 188 group of spots.

A well-defined local source of radio emission (registered on a wave length of λ=3.2, 4.5, 5.1 cm) occurring at the limb of the disk itself and outside of it were of great interest This source could be related either to the coronal condensation over the No 204 group of spots located at the time of the observations on the invisible hemisphere of the Sun (at a distance of 23° from its limb), or to the area of bright green lines in the corona in the region of the spots which existed in the preceeding revolution of the Sun. The circularly polarized radiation component of this source was not registered.

An analysis of curves of the recordings obtained by all of the apparatus after the introduction of instrument corrections and the elimination of the influence of local sources makes it possible to estimate the distribution of "radio brightness" for the solar disk. This problem is of value for opinions concerning the structure of the upper layers of the Sun's chromosphere. However it is already possible to make a deduction concerning the existence of a bright limb on the Sun by the residual fluxes of radiation for certain waves (λ=0.8 and 3.2 cm)

The measurement of the "ellipticity" of the Sun on a wave length of λ=3.2 cm was made during the observations by a new method with the aid of conical scanning patterns of the radiotelescope antenna along the limb of the solar disk. The obtained recordings registered changes in the shape of the studied part of the Sun during the eclipse and for the middle of the annular phase showed that the ellipticity was insignificant -- less than the threshold of sensitivity of the apparatus.

Observations on interferometer equipment (λ=50 cm) registered both the polarized emission of the local source near group No 188, as well as the residual intensity of the emission during the annular phase which surpassed the uncovered area of the Sun's disk. Much scientific work was conducted by the associates of the expedition, in addition to the direct intensive work which is usual for conditions of preparation for observations of a solar eclipse. The results of the preliminary processing of the materials of the joint observations were discussed in a 3-day seminar which was organized in Peiping. Discussions took place on a number of reports made by the Soviet and Chinese participants in the observations. The results of the observations were reported in the branches of the Academia Sinica in Canton, Shanghai, Nanking and in a meeting of the presidium of the academy in Peiping.

Several lectures on the various problems of radio astronomy and astronomy were given by associates of the Academy of Sciences USSR in these same cities.

Four courses on the over all problems of astrophysics and radio-astronomy (three of which were by Chinese scientists) were given in Peiping before leaving for Hainan. In addition to current operations practical work with the equipment at the observations area was organized and associates of the Academy of Sciences USSR gave lectures on topics directly connected with problems set for the expedition.

The successful work of the expedition led the leadership of the Academia Sinica to consider the expediency of organizing a group of associates for setting up radio astronomical observations in China.

The scientific results obtained by the expedition confirm the expediency of conducting complex radio astronomical observations of solar eclipses in a sufficiently large number of parts of the millimeter and centimeter wave bands. It should be noted, in addition, that the successful results of the observations were achieved thanks to the joint efforts of the workers of the Academy of Sciences USSR and the Academia Sinica and the great aid rendered the expedition by various Chinese organizations.

Optical Observations (N. N. Pariyskiy)

Because the 19 April eclipse was an annular one with a maximum phase of 0.94, the basic problems of the physics of the Sun -- problems of the corona and of the chromosphere, studied during full eclipses by optical methods -- were not conducted. The remainder of the solar disk not covered by the Moon still gave off much light, about 1/15th of the emission of the total disk in the visual part of the spectrum. This was not of value for radio astronomical observations since the most important for them was the measurement of the radio emission and of its polarization from separate active regions of the Sun's disk being gradually covered and uncovered by the Moon.

The Chinese astronomers T'ai Wen-sai and Wang Shou-kuan (Siccawei Astronomical Observatory near Shanghai) who were the deputy chiefs of the Chinese part of the expedition, Chang Yu-che (director of the Purple Mountain Observatory) and Prof Tu Hsin-hua (Peking University).

"The investigation of variations of the ozone layer of the Earth's atmosphere during the eclipse (N. N. Pariyskiy's group), the study of the law of darkening of the solar disk to its limb in different wave lengths by the photoelectric method (the group of Chinese astronomers from Nanking University, with whom G. F. Sitnik worked), and the study of variations in

the intensities (equivalent widths) of Fraunhofer lines from the center to the limb of the solar disk with the aid of a long-focus diffraction spectrograph especially built for this purpose by Chinese astronomers of the Purple Mountain Observatory were the aim of the optical observations. The setting up of investigations according to the last two divisions, which are connected with the study of the structure of the solar photosphere and the convective zone of the Sun, was undertaken because the observations could be conducted more accurately during than outside the eclipse as a result of the decrease (by more than one order) of the influence of scattered light from the disk of the Sun. These observations were conducted in one area with radio astronomical observations and were successful if the moment is disregarded when, near the maximum phase, the Sun was obscured temporarily by cumulus clouds.

The observations during the eclipse for changes in the ozone layer are of interest for studying the mechanism of its formation, the explanation of the influence of short wave emissions of the Sun on the formation and disintegration of ozone, and also for explaining the speed of the processes leading to its formation. Very complete data for solving this problem (more than 50 spectrograms in the 3,000-3,900 A region) were obtained during, before, and after the eclipse with the aid of the quartz camera from a nebular spectrograph of the N. N. Pariyskiy system. The final processing of this material will make it possible to establish quantitative data on changes of the ozone layer with the change of the spectral composition of the radiation illuminating it as a consequence of the differences in darkenings of the Sun's limb by the ozone-forming and ozone-disintegrating radiation.

The study of the interplanetary medium, the nature of the Gegenschein, and the physical characteristics of Zodiacal light were conducted outside the eclipse by the optical group during a moonless period (9-23 April). These works were a continuation and development of broad investigations accomplished by V. G. Fesenkov, I. S. Astapovich, B. N. Divari, D. A. Rozhkov, M. G. Karimov, V. V. Karyagina, N. N. Pariyskiy and L. M. Gindilis.

The phenomenon of the Gegenschein still remains puzzling at present. This illumination on the night sky background near a point opposite the Sun is so weak that it can hardly be seen by the naked eye. Its study with instruments began only in the last 10 years. The expedition obtained spectra of the Gegenschein for studying variations of its brightness in absolute units, the distribution of energy in its illumination, and the brightness of the principal lines of the night sky in the region of the Gegenschein.

Material for determining the parallax of the Gegenschein, i.e., for determination of distances up to it, was also obtained.

These observations were conducted four kilometers from the main observation area to avoid night illumination of the sky from nearby villages. Good weather contributed to the gathering of extensive materials.

The Chinese comrades Khu Ren-tskhan and Yu Hai-jen (names transliterated from Russian) were of great assistance in the work with the nebular spectrograph.

A new procedure with the use of new spectral standards -- luminophores of constant action, activated by radiation (prepared by the Laboratory of Luminescense of the Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR) -- was used during operations.

The successful completion of the program of observations was ensured by the exceptionally friendly and cooperative work of the Soviet and Chinese scientists.

Lectures and reports on the problem of the Gegenschein were given on the final observations for Chinese astronomers and geophysicists in Nanking and Peiping ("Annular Eclipse of the Sun; Joint Expedition of Soviet and Chinese Scientists," by A. P. Molchanov and Ch'eng Fang-yun, and N. N. Pariyskiy; Vestnik Akademii Nauk SSSR, No 9, Sep 58, pp 66-71)

Automatic Telescope Control System Developed by Soviets

A collective of scientific associates in the Institute of Electromechanics, Academy of Sciences USSR, under the supervision of Yu. Sabinin, Candidate of Technical Sciences, has developed an automatic control system for modern large telescopes.

The study of the star sky in connection with the launching of artificial Earth satellites acquires all the greater importance and, therefore, the requirements for telescopes and telescope control system are sharply increased. The necessity arose for the automatic movement of a telescope for following the stellar bodies being observed. The automatic follower systems for instruments developed in the Institute of Electromechanics ensures observations of stars, planets, comets and other objects with a high degree of accuracy. The device, created by the Crimean Astrophysical Observatory, makes it possible to photograph automatically the parts of the sky being observed without the direct interference of the astronomer and to conduct spectral investigations of individual stars. A system of automatic coordination for the movement of the telescope and the dome of the tower in which it was mounted was placed into experimental operation in this same Crimean Astrophysical Observatory. The dome moves so that its observation slit automatically follows after the telescope tube. Thus, the participation of the astronomer-observer in the control of the dome and the telescope is wholly eliminated.

A detachment of scientific workers of the institute under the supervision of V. Yegorov recently returned to Leningrad from Crimea, where it had completed mounting an automatic control system for a dome telescope in the observatory.

There, another detachment of associates of the institute under the supervision of P. Nikolayev is completing the setting up of an automatic follower system for the largest telescope (50-inch mirror diameter) in the observatory. ("Telescope Conducts Observations Alone"; Moscow, Izvestiya, 14 Oct 58)

China Builds First Radiotelescope

The first radiotelescope to be built in China was made by instructors and students of the Polytechnic Institute of "Tsinghua." ("Brief Reports"; Moscow, Izvestiya, 17 Oct 58)

II. METEOROLOGY

Lenin Prize Winner's Work on Heat Balance

The Committee on Lenin Prizes in Science and Engineering recently awarded a Lenin Prize to Prof Mikhail Ivanovich Budyko, director of the Main Geophysical Observatory imeni A. I. Voyeykov, for the scientific works Teplovoy Balanc Zemnoy Poverkhnosti (Heat Balance of the Earth's Surface) and Atlas Teplovogo Balansa (Atlas of Heat Balance) which were published in 1956-1957.

The investigation of heat balance has unusually important value for the solution of a large range of scientific and practical problems.

Many scientists have worked on a solution of this important problem; however, up to 40 years ago, a knowledge of the climatic regularities of heat balance were completely inadequate because of the absence of precise methods for the quantitive estimation of the components of heat balance. For many regions of the Earth, even an approximate value of these quantities was unknown.

Computation methods for determining the separate components of heat balance acquire particular value in connection with the absence up to now of a number of instruments which would permit their direct measurement. These methods make it possible to calculate the values of the components of heat balance according to data of mass meteorological observations.

Great credit for the development of the methods and also for their use in determining the heat balance of the entire Earth belongs to Mikhail Ivanovich Budyko. Under his supervision, the first heat balance atlas in the world, containing both monthly and annual maps of the basic heat balance terms, was compiled.

The world maps make it possible to estimate the income of solar heat to the surface of the land and oceans, to determine the quantity of heat given off by the surface of the oceans into the atmosphere, and to make a number of conclusions concerning the regularities of heat and moisture exchange between the oceans.

The use of the obtained results for the solution of a number of agricultural problems had an important place in Budyko's investigations. In them are proposed methods of determining the evaporation of moisture from fields, making it possible to establish the most favorable conditionc for the growing of plants, and their rational allocation in different geographical zones.

The method of heat balance made it possible to precalculate changes in the meteorological regime in fields as a result of meliorative measures. The results can also be widely used in calculating irrigation norms, in determining evaporation in projected water reservoirs, in planning shelter belts, and other methods of artificial climate regulation.

The method of heat balance opened completely new possibilities for studying the over-all problem of physical geography.

Developing an idea of Academicia A. A. Grigor'yev's, Budyko determined that the distribution of geographic zones corresponds to determined graduations of heat as a basic energy factor, and also of the moisture. This makes it possible to investigate the causative regularities of the formation of geographic zones for all land surfaces. Hence, a number of new conclusions were made in relation to the physical causes for the location of the boundaries of geobotanical and soil zones. This also served as a basis for constructing new maps of climatic regioning for the USSR.

Budyko's creative use of quantitative methods in the investigation of the problem of physical geography aids in drawing it closer to geophysical geography and comprises a new step in the development of physical geography in general and climatology in particular.

The works of Budyko is one of the greatest achievements of modern climatology -- the development of a new scientific trend, -- the climatology of heat balance. ("Lenin Prize Winner"; Leningrad, Meteorologiya i Gidrologiya, No 7, Jul 58, pp 65-66)

Description of Soviet Pogoda (Weather) Computer

The "Pogoda" computer is a special-purpose, electronic digital computer used at the Central Institute of Forecasts. It is intended for the solution of problems which may be reduced to the calculation of sums of paired products or for those problems in which such calculations comprise the most laborious part of the problem's solution. The problems concerning the expansion of functions in series and the summing of series belong to the class of problems which may be solved on the computer, as do the calculation of values of a polynomial, the solution of certain systems of linear equations of high orders, the calculation of correlation functions, and others.

Solution of the given problems leads to the calculation of sums of paired products having the form

$$\sum_{i=n}^{n} a_{ik} b_{ik} \qquad (1)$$

where $k = 1,2, \ldots, m$;

$$Y_{n+k} = a_{k(n)} Y_{n+k-1} + \ldots + a_{1(n)} Y_{n}; \qquad (2)$$

$$r = \sqrt{cp \sum_{k=1}^{n} v^2}, \qquad (3)$$

where $p = 1/(n-1)$, and c is a constant coefficient.

It is characteristically necessary to consider the question of matrix multiplication for problems of this class and, consequently, for problems to be solved on the "Pogoda" computer.

The form of representing numbers in the computer is natural with a fixed-point in front of the greatest power. The numbers entering the computer and the results of the calculations may have decimal numbers of two ranges of significance: five digit and ten digit. Numbers of intermediate order are reduced to them by the addition of zeros. There is no operative storage in the machine, but it has a cyclic internal memory accomplished on magnetic tape.

The numbers, punched on perforated tape (the method of plotting was indicated in the article) are entered into the machine simultaneously at two inputs. One of the inputs serves for the input of numbers in the binary system, and the other for the input of numbers in the decimal-binary system. The number system employed within the computer itself is the binary.

The "Pogoda" computer performs the operations of addition, subtraction, multiplication, accumulation of the sums of paired products, and the extraction of square roots. Multiplication and addition (subtraction) of five digit numbers are accomplished with a speed of 200 operations per second (for ten digit numbers these operations are conducted at a speed of 100 operations per second).

In the computer, a system of commands is accepted consisting of 14 instructions. Each command adopts a defining number; namely, the code of the command Intermediate results of the calculation are registered on magnetic tape or are delivered at the output perforator, where they are placed on punched tape. The final results of the problem's solution are placed on paper tape by the printer.

The computer has approximately 400 electron tubes, a large number of semiconductor diodes, and other radio engineering parts.

A block diagram of the computer as well as photos of the control panel, trigger cell, keyboard and input perforator, control reading device, and output perforator and printer are given.

The procedure followed by the computer in finding the product of two matrices was also given in the article. ("Electronic Computer 'Pogoda'," by N. M. Potiyevskiy; Meteorologiya i Gidrologiya, No 8, Aug 58, pp 51-57).

Soviet Work on Tsunami Early-Warning System

A recent monograph issued by the Council on Seismology of the Academy of Sciences USSR, is reviewed in part by I. Taycher, Izvestiya correspondent. The publication describes in detail the destructive tsunami which reached the Kurile and Kamchatka shores on the night of 4-5 November 1952, and the earthquake which accompanied it. Photographs showing the aftereffects of the destructive action of the tsunami were compiled by the commission of the Academy of Sciences under the supervision of Prof Ye. F. Savarenskiy, noted Soviet seismologist.

Prof Savarenskiy thinks that the gigantic tsunami arise during sudden changes of the volume of a basin. Such changes most frequently occur during earthquakes. Faults and displacements of the Earth's crust are formed at the same time. If the fault occurs at the bottom of the ocean, then the volume of the water basin changes. Compression and decompression waves arise in the water which, on reaching the surface give rise to gigantic tsunami -- high long waves.

The following measures have been taken to create a warning system for the populated areas on the shores of Kurile and Kamchatka.

Prof Ye. F. Savarenskiy, chief of the commission of the Academy of Sciences for the study of tsunami describes the warning service which is administered by the Main Administration of the Hydrometeorological Service, USSR.

High speed apparatus are now being built in the Institute of Physics of the Earth which enable observers, in the course of several minutes, to determine the location of epicenters and the intensities of submarine earthquakes even from the data of a single station.

Soviet scientists created the first version of a system of regioning dangerous waves. This important work was accomplished by associates of the Institute of Physics of the Earth, the Marine Hydrophysics Institute, the Institute of Oceanology, and the Sakhalin Institute of the Academy of Sciences USSR.

A theoretical scheme for calculating the propagation of waves was created in the laboratory of L. N. Sretenskiy, corresponding member of the Academy of Sciences USSR, in the Marine Hydrophysics Institute.

Hydroacoustical stations can also give quick warnings of danger from tsunami. Interesting work in this connection has been done by L. M. Brekhovskiy, corresponding member of the Academy of Sciences USSR. Intensive sound waves occur in the depths of the waters simultaneously with the origin of tsunami. These are propagated under water considerably faster than the tsunami travel, and five times more rapidly than through the air. The hydroacoustical stations on the shores can not only detect these forewarning sounds, but also determine the location of their point of origin. ("Tsunami," by I. Taycher; Moscow, Izvestiya, 18 Oct 58)

IV. OCEANOLOGY

Zarya to Conduct Magnetic and Geological Study of Indian Ocean

The Soviet nonmagnetic ship Zarya is returning to the USSR reports V. Pochtarev, chief of the Leningrad Branch of the Scientific Research Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation (NIZMIR).

The expedition under the supervision of M. Ivanov, Leningrad scientist, performed much work during the 14 months since the beginning of the voyage.

The Zarya will depart on a new voyage fulfilling work according to the IGY program after brief repairs in a Leningrad ship repair yard. A magnetic and geological study of the Indian Ocean will be made. ("Zarya Sets A Course For Home;" Moscow, Izvestiya, 18 Oct 58)

Soviet Oceanological Investigations in Pacific to be Expanded

The Institute of Oceanology, Academy of Sciences USSR, in accordance with the IGY program conducted investigations in the western and central parts of the Pacific Ocean and established scientific contacts with the scientists of Japan, Rabaul, Fiji, New Caledonia, and New Zealand.

The investigations established the boundaries of currents and water masses, the geographical zonality of the central part of the Pacific Ocean, the interconnection between the physical, chemical, biological, and geological phenomena and processes; material on the radioactivity of the waters, the slimes and organisms was obtained; the maximum depths of the world oceans (10,990 meters in the Mariana depression), and also the maximum depths of the depressions of the southern hemisphere, the Tonga, Kermadec, and New Hebrides, were established; and a new depression was discovered.

The Presidium of the Academy of Scineces USSR approved the scientific investigations conducted by the institute, and acknowledged the necessity of organizing an international expedition for the investigation of the Indian Ocean on the Vityaz, in 1959-1960.

The joint development of a project for the expansion of marine investigations in the Far East with the Institute of Oceanology was proposed to the Siberian Branch of the Academy of Sciences USSR.

Measures for expediting the construction of the scientific bases of the Institute of Oceanology and the Marine Hydrophysics Institute in Vladivostok were outlined in the Presidium's decree. ("Results of the Institute of Oceanology's Investigations in the Pacific Ocean;" Vestnik Akademii NaukSSSR, No 9, Sep 58, pp 97-98)

V. ARCTIC AND ANTARCTIC

Radio Operators in Antarctic

Radio engineering and electronics have been of great assistance in the extensive scientific activities of the Antarctic expedition. Radio electronic instruments help to carry out a large program of observations of cosmic rays in the ionosphere, research on the atmosphere at altitudes of 30-38 kilometers, and measurements of the ice thickness. Radio contact is maintained constantly between Mirnyy and the interior stations, sled-tractor trains, planes, and with Moscow. Radio engineering equipment is one of the principal navigational aids for planes and sled-tractor trains. For this reason, radio specialists constitute 20 percent of the total number of Antarctic expedition members. In addition to the radiomen included in the special detachment of radio communications and radio navigation, radio specialists are assigned to many of the other scientific detachments.

The radio detachment of the Third Antarctic Expedition is headed by Yuriy Vasil'yevich Fedorenko, who worked for several years as chief engineer at the radio center of Dikson before going to the Antarctic.

The station Vostok is headed by an experienced polar worker, radio technician V. S. Sidorov. He has a staff of 11 men, including B. S. Chernov, also an experienced polar radioman; M. K. Rybchenko, radio engineer; and O. P. Kolomiytsev, engineer of the ionospheric station.

M. A. Fokin, radio technician, is chief of the station Komsomol'skaya. During a period of 10 years, he wintered at polar stations in the western sector of the Arctic. P. V. Sorokin, senior radio technician, worked many years at polar stations in the eastern sector of the Arctic and then at Severnyy Polyus-4 and Severnyy Polyus-5.

The station Sovetskaya is headed by V. K. Babarykin, aerologist, a veteran of the Antarctic. He is one of the founders of the station Pionerskaya. G. A. Malikov, radio technician, is also working at Sovetskaya. He took part in the first oversnow expedition to Pionerskaya and was one of the first radiomen at that station. Under the supervision of Malikov, the radio station at Sovetskaya is operating faultlessly. It maintains contact not only with Mirnyy and the interior stations, but frequently helps to establish contact with Pionerskaya.

The radio station at Pionerskaya was formerly headed by Ye. T. Vetrov, member of the First Antarctic Expedition, who has been replaced by V. I. Sushanskiy, an experienced radio technician.

The station at Oazis is headed by hydrologist B. I. Imerskov. Even though the temperature at this location does not go below minus 35 degrees Centigrade, the winds often reach hurricane velocity, about 50 meters per second. This has often caused damage to the radio installations.

In preparation for the oversnow expedition into the interior, several radiomen are developing a portable ionospheric station, which they plan to use on the return trip to conduct ionospheric research. P. V. Ionosilevich, engineer of the aerial detachment, plans to conduct experiments in long-range reception of television transmissions. P. D. Tselishchev is conducting continuous observations and recording signals of Sputnik III on magnet tape. ("Explorers of the Sixth Continent," by V. Parfenov, chief engineer of the expedition; Moscow, Radio, No 9, Sep 58, pp 11-12)

Gigantic Iceberg Encountered in Antarctic

In March 1958, during one of their exploratory trips, members of the continental unit of the Third Complex Antarctic Expedition, discovered a huge tabular iceberg about 70 kilometers from the Shackleton Ice Shelf. Surveying it from the plane, the polar explorers concluded that the ice mass, extending from east to west, reached a length of 90 kilometers and a width of 30 kilometers, covering an area of about 270 square kilometers. The above-water portion of this huge iceberg rose to 40 meters.

Icebergs of this size are extremely rare and therefore each occurrence of one presents considerable scientific interest, as it bears witness to marked changes in the glacier borders.

The usual length of icebergs is between 100 and 400 meters. However, larger icebergs have been encountered in antarctic waters. During the 20th Century, the largest icebergs were observed in the Weddell Sea and Ross Sea from the ships Glacier, Odd I, and Discovery I. The iceberg observed from the Norwegian whaling ship Odd I near Clarence Island, in January 1927, was the largest of all, i.e., 180 kilometers long, 180 kilometers wide, and 40 meters above the water.

The iceberg discovered by the Soviet expedition was the fourth largest in size of all those encountered during the 20th Century in the Antarctic. It is assumed that it was formed as a result of a huge ice mass breaking off the Shackleton Ice Shelf in an area adjoining the Denman Glacier. This has been confirmed by cartographic materials. In comparing the latest cartographic data on the region of Shackleton Ice Shelf with data of earlier investigations, considerable changes in the outlines were discovered. ("Gigantic Iceberg in the Antarctic," by I. Ya. Lapina, Council for Antarctic Research of Academy of Sciences USSR; Moscow, Priroda, No 8, Aug 58, p 117)

New Data on the Geology of East Antarctica

L. V. Klimov and D. S. Solov'yev, scientific associates of the Institute of Geology of the Arctic, who took part in the Antarctic Expedition, have assembled the results of their latest geological research conducted during the voyage of the Ob' along the coast of East Antarctica.

The studies, which were begun in this area in 1956, were continued in 1958 between 110 and 165 degrees East longitude, covering a distance of 3,000 kilometers. Until now, information was available only on the central part of this area, including the adjoining sections of Adelie Land and King George V Coast, where the Australian and French expeditions worked in the past.

The Soviet geologists conducted observations in conjunction with aerial photography of the coast. The results of the study of a newly discovered and mapped mountain region, Oates Coast, proved especially important. It was established that the greater part of the explored coast must be considered as part of the East Antarctic plateau. During an extended period, this region was subjected to a so-called "block dislocation," as a result of which there appeared on various portions of the coast outcrops not only of the sedimentary "cover" (chekhol), but also of the foundation of East Antarctica, which has a two-level structure. ("News on the Geology of East Antarctica," Moscow, Vodnyy Transport, 9 Oct 58)

Information Bulletin of Soviet Antarctic Expedition

The Arctic and Antarctic Institute has begun the publication of an information bulletin of the Soviet Antarctic Expedition to present current information on the work of Soviet scientists in the Antarctic. The bulletin deals with current activities of the expedition, brief scientific reports and notes of observers, and included reviews of Soviet literature on the Antarctic.

The first number of the bulletin, published in August, begins with an article by Doctor of Geographic Sciences M. M. Somov, chief of the First Antarctic Expedition, who reviews the activities of the expedition. Prof I. V. Maksimov describes the activities of the marine group of the expedition. Several articles are devoted to geology and geomorphology of the Antarctic. The new information on elevations of East Antarctica and the glaciation of the continent, contained in articles by A. F. Treshnikov and A. N. Kapitsa, is of great interest. In addition, the bulletin discusses the ice regime of Davis Sea, the temperature regime of the snow cover in interior regions of Antarctica, and a number of other no less interesting subjects.

The permanent section, "By radio From the Antarctic," gives detailed information on the work of polar explorers at the main base of the expedition, Mirnyy, and the interior stations. Brief notes at the end of the bulletin describe rare and interesting phenomena observed in the Antarctic.

The bulletin is intended for a wide circle of readers who are interested in Soviet research in the Antarctic. The articles and communications are illustrated with sketches, photographs, and maps. ("Information Bulletin of Antarctic Expedition"; Moscow, Vodnyy Transport, 2 Oct 58)

Meetings With Members of Antarctic Expedition

Early in May 1958, the Ministry of Maritime Fleet and the Academy of Sciences USSR organized a reception for the members of the Second Complex Antarctic Expedition of the Academy of Sciences USSR. V. G. Bakayev, Minister of Maritime Fleet USSR; D. I. Shcherbakov, chairman of the Council for Antarctic Research under the Presidium of the Academy of Sciences USSR; and A. A. Afanas'yev, chief of the Main Administration of the Northern Sea Route and Deputy Minister of Maritime Fleet, congratulated the expedition members with their safe return to the homeland and the successful fulfillment of the plan for expeditionary work and wished the health and further success in their work.

On 5 May, a meeting was held of workers of the aerometeorological detachment of the Second Antarctic Expedition, O. G. Krichak, S. S. Gaygerov, I. D. Kopanev, A. V. Solopov, I. I. Gorev, and N. V. Mamontov, with the leading officials of GUGMS (Main Administration of Hydrometeorology Service) and representatives of Moscow scientific research institutions of the Hydrometeorological Service. M. Ye. Ivanov, acting chief of GUGMS, welcomed the returning antarctic explorers and wished them further success.

O. G. Krichak, chief of the aerometeorological detachment, gave a detailed report on the preliminary results of the work of the aerometeorological detachment. New, important data have been obtained on the atmospheric circulation over Antarctica and over the whole Southern Hemisphere. Special attention was given in this research to the meridional circulation in these regions.

The aerometeorological detachment has done excellent work. The best proof of this are the 2,200 regular radiosonde launchings, including some under difficult weather conditions. Particularly at the station Oazis, radiosonde launchings were carried out unde · wind velocities of over 50 meters per second, sometimes as high as 65 meters per second. The equipment of the expedition proved entirely satisfactory. ("Meetings of Members of the Antarctic Expedition;" by R. A. Khrolov, Leningrad, Meteorologiya i Gidrologiya, No 8, Aug 58, p 64)

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